

NOTES:

PERSONAL COMPUTER MONITORING AND CONTROL SOFTWARE

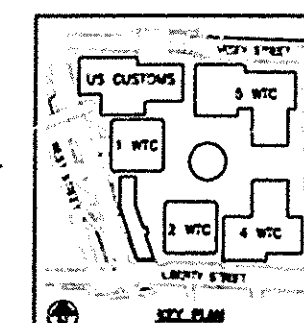
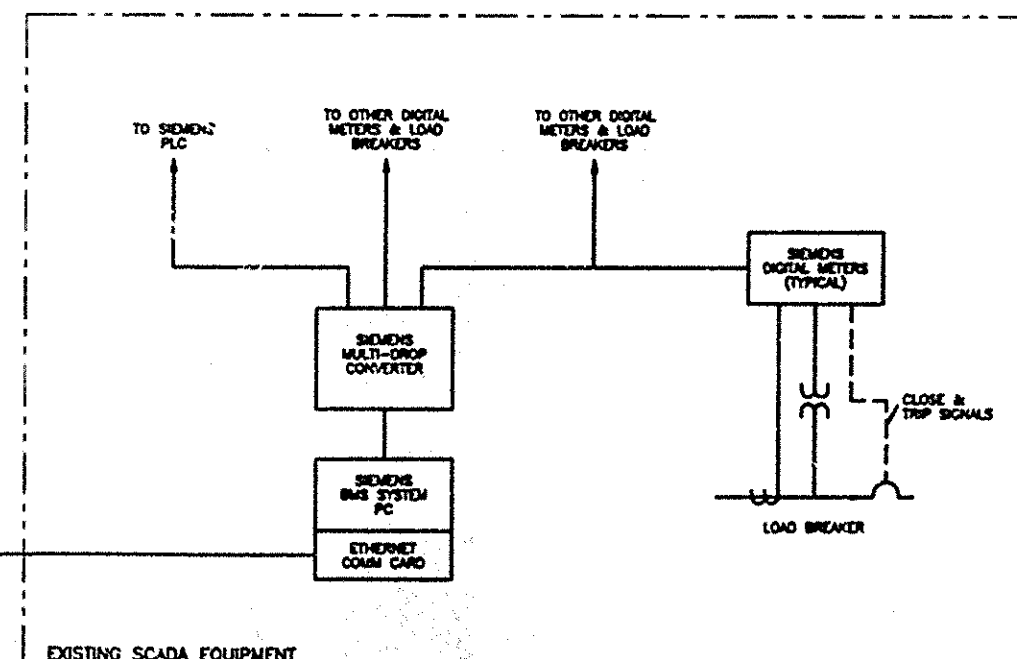
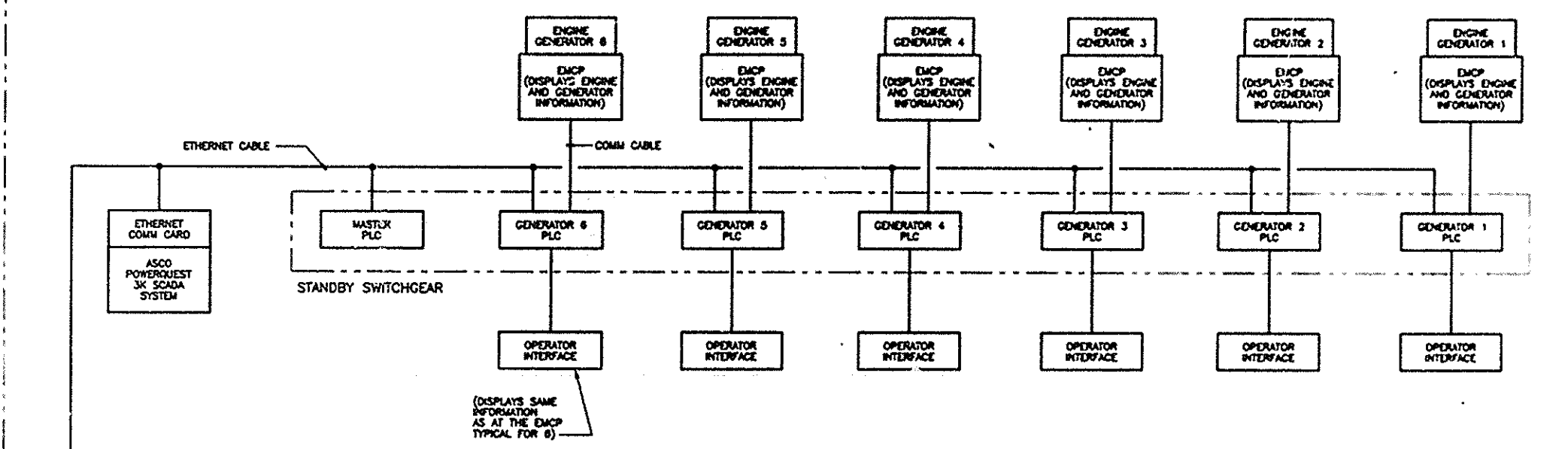
- THE SWITCHGEAR REMOTE MASTER CONTROL PANEL SHALL BE CAPABLE OF COMMUNICATING WITH A PERSONAL COMPUTER AND DISPLAY GENERATOR SET, TRANSFER SWITCH AND SWITCHGEAR INFORMATION.
- SYSTEM SHALL BE DESIGNED SO IT WILL NOT DETRACT FROM THE PRIMARY FUNCTION OF THE SWITCHGEAR.
- SOFTWARE SHALL RUN UNDER WINDOWS NT PLATFORM.
- SOFTWARE INTERFACE SHALL BE OBJECT-ORIENTED HIGH RESOLUTION GRAPHICAL.
- SOFTWARE SHALL HAVE THE ABILITY TO INTEGRATE TO THE EXISTING SIEMENS BUS SYSTEM. THE EXISTING SIEMENS BUS SYSTEM WILL BE UPGRADED AS FOLLOWS:
 - CONNECTION BETWEEN THE TWO SYSTEMS SHALL BE THROUGH A ETHERNET CONNECTION UTILIZING A 3 COM 3000S.10/100 PCI.
 - THE SIEMENS WINCC APPLICATION SOFTWARE MUST BE UPGRADED TO VERSION 4.0 (AVAILABLE THE FIRST QUARTER OF 1998).
 - THE PARTY PERFORMING THE SOFTWARE UPGRADE OF THE EXISTING SIEMENS SYSTEM MUST COORDINATE WITH THE PERSONNEL PROGRAMMING THE NEW MONITORING SYSTEM IN ORDER TO MONITOR AND CONTROL THE PROPER DATA POINTS BETWEEN THE SYSTEMS.
- THE SOFTWARE SHALL PROVIDE THE FOLLOWING:
 - EMERGENCY POWER SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM
 - SOFTWARE SHALL ALLOW ACCESS TO CONTROL FUNCTIONS FROM THE SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM AS DEFINED IN OPERATIONAL PROCEDURE.
 - SYSTEM ELEVATION AND SYSTEM ONE-LINE DIAGRAM SHALL DISPLAY INDIVIDUAL SYSTEM COMPONENTS ALARM CONDITIONS IN BRIGHT COLORS.
 - THE SOFTWARE SHALL DISPLAY THE FOLLOWING INFORMATION:
 - GENERATOR SET OPERATIONAL INFORMATION
 - SWITCHGEAR OPERATIONAL INFORMATION
- THE SOFTWARE SHALL DISPLAY AND ALLOW INFORMATION FROM THE FOLLOWING TO BE MONITORED:
 - GENERATOR SETS
 - SWITCHGEAR

COMMUNICATIONS

- THE SWITCHGEAR SHALL BE CAPABLE OF COMMUNICATING WITH THE GENERATOR SET CONTROLLER THROUGH A TWISTED PAIR OF WIRE.
- THE SWITCHGEAR WILL RECEIVE NON-VITAL GENERATOR SET ENGINE INFORMATION THROUGH A TWISTED PAIR OF WIRE AND DISPLAY THE ENGINE WARNINGS AND FAULTS ON AN ANNUNCIATOR MODULE LOCATED ON THE ASSOCIATED GENERATOR SET CONTROL CUBICLE AND ON THE PERSONAL COMPUTER SCADA SYSTEM.
- ENGINE GENERATOR START, STOP, GOVERNOR, AND VOLTAGE REGULATOR CONTROL SHALL BE VIA HARD WIRE INTERCONNECTIONS.
- THE SWITCHGEAR WILL RECEIVE GENERATOR SET ENGINE INFORMATION THROUGH A TWISTED PAIR OF WIRE AND AS AN OPTION DISPLAY ENGINE INFORMATION ON A CONTROL INTERFACE MODULE LOCATED ON THE ASSOCIATED GENERATOR SET CUBICLE.
- THE CONTROL INTERFACE MODULE SHALL HAVE A LIGHTED DISPLAY WITH ALPHANUMERIC CHARACTERS FOR MESSAGES AND A NUMERIC KEYPAD.
- THE CONTROL INTERFACE MODULE SHALL COMMUNICATE WITH THE PLC.
 - ALL OUTPUT VOLTAGES - SINGLE PHASE, THREE PHASE AND LINE-TO-NEUTRAL.
 - ALL SINGLE PHASE AND THREE PHASE CURRENTS.
 - GENERATOR SET OUTPUT FREQUENCY.
 - GENERATOR SINGLE PHASE AND AVERAGE THREE PHASE PF FACTOR.
 - TOTAL AND PHASE KILOWATT LOADING, TOTAL AND PHASE REACTIVE POWER LOADING, TOTAL KILOWATT-HOURS, TOTAL KILOVAR-HOURS.
 - PERCENTAGE OF RATED GENERATOR POWER.
- THE FOLLOWING ENGINE PARAMETERS SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
 - ENGINE COOLANT TEMPERATURE
 - ENGINE OIL PRESSURE
 - RIGHT EXHAUST TEMPERATURE
 - LEFT EXHAUST TEMPERATURE
 - BATTERY VOLTAGE
 - ENGINE RPM
- THE FOLLOWING GENERATOR ENGINE OPERATIONAL INFORMATION SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
 - CYCLE CRANK TIME SETPOINT
 - TOTAL CRANK TIME SETPOINT - TOTAL TIME AFTER WHICH AN OVERCRANK FAULT IS DECLARED
 - COOLDOWN TIMER SETTING
 - OVERSPEED SETTING
 - ENGINE LOW OIL PRESSURE SETTING @ RATED SPEED
 - ENGINE LOW OIL PRESSURE SETTING @ IDLE SPEED
 - HIGH ENGINE COOLANT TEMPERATURE SETTING
 - LOW ENGINE COOLANT TEMPERATURE SETTING
 - CRANK TERMINATE SPEED SETTING
- THE FOLLOWING GENERATOR SET SHUTDOWN SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE CONTROL INTERFACE MODULE:
 - EMERGENCY STOP
 - HIGH COOLANT TEMPERATURE
 - HIGH ENGINE OIL TEMPERATURE
 - CONTROLLER DIAGNOSTIC FAULT
 - COOLANT LOSS
 - OVERCRANK
 - OVERSPEED
 - OVER-VOLTAGE
 - UNDERFREQUENCY
 - UNDERVOLTAGE
 - SPEED SENSOR SIGNAL OUT OF RANGE
 - SPEED SENSOR SIGNAL TOO HIGH

- THE FOLLOWING GENERATOR SET WARNINGS (PRE-ALARMS) SHALL BE CAPABLE OF BEING MONITORED AT THE GENERATOR SET CONTROLLER AS WELL AS AT THE GENERATOR INTERFACE MODULE:
 - BATTERY CHARGER FAILURE
 - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL OUT OF RANGE
 - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL TOO HIGH
 - ENGINE COOLANT TEMPERATURE SENSOR SIGNAL TOO LOW
 - ENGINE COOLANT TEMPERATURE SIGNAL LOSS
 - GROUND FAULT DETECTED - SPARE FAULT INPUT
 - HIGH BATTERY VOLTAGE
 - HIGH COOLANT TEMPERATURE
 - LOW BATTERY VOLTAGE
 - LOW COOLANT TEMPERATURE
 - LOW OIL PRESSURE
 - ENGINE OIL PRESSURE SENSOR SIGNAL OUT OF RANGE
 - ENGINE OIL PRESSURE SENSOR SIGNAL TOO HIGH
 - ENGINE OIL PRESSURE SENSOR SIGNAL TOO LOW
- PROVIDE ADDITIONAL SOFTWARE, SOFTWARE MODIFICATIONS, HARDWARE AND INTERFACE DEVICES CIRCUITS, ETC. TO THE EXISTING BUILDING SCADA SYSTEM TO INCORPORATE AND UPGRADE FOR ETHERNET COMMUNICATIONS AS REQUIRED FOR MONITORING AND CONTROL THE OPERATION OF THE GENERATORS PARALLELING AND CONTROL SYSTEMS AND OTHER ALARM DEVICES AS SHOWN ON DRAWINGS.
- PROVIDE SIEMENS ISOLATED MULTI-DROP CONVERTERS, ONE AT B2 LEVEL OUTSIDE OF FUEL OIL TANK ROOM, ADJACENT TO THE FUEL OIL MANAGEMENT PANEL AND ONE AT THE GENERATOR BULKHEAD AS SHOWN ON DRAWING NOS. E3-02 AND E4-03. EACH CONVERTER HAS 4 PORTS THAT CAN SUPPORT 32 DEVICES EACH, FOR A TOTAL OF 128 DEVICES ON EACH OF THE PC'S SERIAL PORTS. CONFIGURE, INTEGRATE AND TEST THE SCADA SYSTEM AS FOLLOWS:
 - CONFIGURE THE SYSTEM, INCLUDING INSTALLATION OF APPLICABLE SOFTWARE, DEVELOPMENT OF DISPLAY SCREENS, POINT ADDRESS AND DESCRIPTION.

GENERATOR PARALLELING GEAR EQUIPMENT



Sheet 49 of 112

THE PORT AUTHORITY
OF NY & NJ

CONFORMED DRAWING
08/13/98
SIGNED AND SEALED
COPY IS KEPT ON FILE

ORIGINAL SIGNED & SEALED BY
N.Y. P.E. (OR R.A.)

Joseph R. Loring
& Associates, Inc.
consulting engineers
One Pennsylvania Plaza
New York, New York 10119-0043
Tel: (212) 363-7400, Fax: (212) 363-7382

THE OFFICE OF
DAVID
BLUM
LPC/OWITZ
PC
ARCHITECTS & PLANNERS
NEW YORK, NEW YORK 10119-0043
Tel: (212) 363-7400, Fax: (212) 363-7382

LESLIE E. ROBERTSON
ASSOCIATES, P.L.L.C.
CONSULTING ELECTRICAL ENGINEERS
NEW YORK, NEW YORK 10119-0043
Tel: (212) 363-7400, Fax: (212) 363-7382

Engineering Department
Design Divisions

The
World
Trade
Center

STANDBY POWER
5 WORLD TRADE CENTER

ELECTRICAL
SCADA SYSTEM
BLOCK DIAGRAM

This drawing subject to conditions in contract
for installation, design, construction and performance
herein are reserved to P&H Authority and
may not be used without its written consent.

11/17/97
WTC-045.071
E1-05